Climate Change Research Program

RESEARCH INVESTMENT PLAN

CALIFORNIA STRATEGIC GROWTH COUNCIL

Updated August 30, 2018

Program information can be accessed at:
http://sgc.ca.gov/programs/climate-research/

To sign up to receive notices, updates, and information regarding the Climate Change Research Program (and other SGC grant programs and initiatives), visit the Strategic Growth Council (SGC) website and click on the "Sign Up for Updates" icon at: http://sgc.ca.gov.

To receive a hardcopy of this Plan, please contact the SGC at research@sgc.ca.gov or (916) 327-5362.

Research Investment Plan: Climate Change Research Program

The Strategic Growth Council (SGC) approved the fiscal year 2017-18 Research Investment Plan for the Climate Change Research Program on January 29, 2018. This update provides general information about what sort of research the Council will authorize with Research Grant program funding Following a Legislative funding appropriation to the Climate Change Research Program as part of its annual allocation of Greenhouse Gases Reduction Fund revenues, the SGC will release a program grant solicitation document and host technical workshops for eligible applicants. Additional information about solicitation documents are available on the SGC's website at:
http://sgc.ca.gov/programs/climate-research/

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The California Strategic Growth Council brings together State agencies and departments to coordinate activities that support sustainable communities, emphasizing strong economies, social equity and environmental stewardship.

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I. INTRODUCTION

1) BACKGROUND

Research has been an integral element of California's climate change strategy for the past two decades. The State's research investments have provided valuable information on current and projected impacts from a changing climate, the design and effectiveness of climate change policies, and technological change. The Strategic Growth Council (SGC) Climate Change Research Program extends and augments this legacy of investment.

In 2017, the Legislature passed Assembly Bill (AB) 109, which created a climate change research program within the SGC. The legislation allocates $11 million in Greenhouse Gas Reduction Fund revenues to the SGC to develop a research program to support "research on reducing carbon emissions, including clean energy, adaptation, and resiliency, with an emphasis on California."

AB 109[1] guides the development of the SGC Climate Change Research program, and directs that this Program will:

- Be guided by a Research Investment Plan that outlines research needs. The Research Investment Plan will be developed prior to awarding grants;
- Award grants on a competitive basis; and
- Be open to eligible institutions, including the University of California, California State University, federally-funded national laboratories, and private, non-profit colleges and universities.

This document is the Research Investment Plan that will guide the development and implementation of the research program as funding becomes available, and provide a foundation for all of the Council's research investments. It outlines program goals, research priorities, program structure, program review and award process, and other administrative items. This Plan was originally published in January 2018 and will be revisited and revised every three years.

The AB 32 Scoping Plan establishes the framework for actions implementing greenhouse gas reduction to implement the Global Warming Solutions Act of 2008. The Scoping Plan was updated by the California Air Resources Board (CARB) in 2017, identifying the Cap-and-Trade Program as one of the strategies California will employ to reduce the greenhouse gas (GHG) emissions that cause climate change. Research conducted through this program will help put California on the path to meet its goal of reducing GHG emissions to 40 percent below 1990 levels by the year 2030, and ultimately achieving an 80 percent reduction from 1990 levels by 2050. Proceeds from the Cap-and-Trade Program, also known as California Climate Investments (CCI), facilitate comprehensive and coordinated investments throughout California that further the State's climate goals. These investments must be used to support programs that facilitate GHG emissions reduction in the State and also deliver major economic, environmental, and public health benefits for Californians, including meaningful benefits to the most disadvantaged communities. Assembly Bill 398[2], chaptered in 2017 and referenced in the recently adopted scoping plan, identified additional legislative priorities for appropriating California Climate Investments including, but not limited to, climate and clean energy research and climate adaptation and resiliency.

[1] Assembly Bill 109 (2017, Ting). Chapter 249, Statutes of 2017: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB109

[2] Assembly Bill 398 (2017, Garcia). Chapter 135, Statutes of 2017. [California Health and Safety Code §38590.1]: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398

The Program is an opportunity to advance the SGC's vision to support healthy, vibrant, and resilient communities. The Program is designed to leverage SGC's role as an interagency body to focus on crosscutting research investments that build community resilience, integrate land use and development considerations, and facilitate the transformation of California communities through outcome-based research. The Program will demonstrate how the State's investment can build an innovative, outcome-driven partnership between the State and the research community that will directly support achieving California's climate change goals.

II. PROGRAM GOALS

The Climate Action Team's Research Working Group is a body that includes representatives of nearly all executive branch agencies, boards, departments, and offices. In 2015, the Working Group developed a Climate Change Research Plan.[3] The 2015 Plan identified research needs and priorities for the next three to five years. The Plan was the State's first multi-agency climate change research plan, and it considered research needs in four areas: monitoring and modeling; greenhouse gas emission reduction; adaptation and resilience; and cross-cutting research needs. Following public workshops and a public comment period, the Climate Action Team approved the 2015 Plan. The intention of the 2015 Plan was to inform individual agency research programs. Therefore, it is being implemented through a number of State initiatives, including the research programs of the California Air Resources Board, California Department of Transportation, California Energy Commission[4]. Specifically the recently published **California's Fourth Climate Change Assessment**, a cross-cutting research initiative led by the California Energy Commission, California Natural Resources Agency, and the Governor's Office of Planning and Research[5]; and the **Paying it Forward: The Path Toward Climate-Safe Infrastructure in California** report[6] by the AB 2800 Climate-Safe Infrastructure Working Group provide helpful data and recommendations for achieving the State's climate research goals.

The 2015 Plan provides a strong foundation for SGC's research program. The direction provided by that plan and discussions with implementing departments on implementation progress have helped identify goals for SGC's Climate Change Research Program. These goals were also informed by discussion at the October 23, 2017 SGC Meeting[7] and subsequent discussions at 2018 SGC meetings. All applicants must demonstrate how a proposal is consistent with the seven Program Goals.

The goals of the SGC Climate Change Research Program are to leverage SGC's role as a cross-agency body to:

1. **Invest in research that has a clear and demonstrated connection to the State's climate change goals, including greenhouse gas emission reduction and climate change adaptation and resilience**

   All research projects and partnerships will include a description of how the research will support achieving the State's climate goals. It is expected that this could be through diverse avenues, including tool development to support planning, studies to support technology adoption and deployment, or other approaches to understand and identify barriers, challenges, and opportunities for policy design, implementation, and evaluation.

[3] http://climatechange.ca.gov/climate_action_team/reports/CAT_research_plan_2015.pdf
[4] CARB Research Program: https://ww2.arb.ca.gov/our-work/programs/research-planning
Caltrans Research Program: http://www.dot.ca.gov/drisi/
CEC Research Program: http://www.energy.ca.gov/research/
[5] Fourth California Climate Change Assessment: http://www.climateassessment.ca.gov/
[6] Paying if Forward Report: http://resources.ca.gov/climate/climate-safe-infrastructure-working-group/
[7] October 23, 2017 SGC Meeting Agenda and link to Video: http://sgc.ca.gov/Public-Meetings/2017/Meeting-Materials-10232017.html

2. **Advance research to support low-income and disadvantaged communities, and advance equitable outcomes in the implementation of the State's climate change policies and investment**

   Research projects and partnerships should be designed to address and facilitate achieving climate outcomes in low-income and disadvantaged communities. This can be achieved through direct connection with communities and community-based organizations, explicit examination of replicability of projects in low-income and disadvantaged communities, or other mechanisms that demonstrate how research investments will be leveraged to support low-income and disadvantaged communities.

3. **Develop a research program that augments, builds connections, and fills gaps across current State research programs**

   Research projects and partnerships should reflect innovative and cross-disciplinary approaches to addressing research questions and, where possible, link to or build of off previous State research investments.

4. **Prioritize outcome-based research linked to practical climate action**

   Outcome-based research will make a direct connection to enabling climate actions. This could include projects that support on-the-ground action in the community or region; directly reduce GHG emissions via technology development or deployment; or pilot projects.

5. **Model meaningful engagement with the research community, community-based organizations and other stakeholders at all stages of the program to ensure relevance and utility of research process, projects, and results**

   Engagement should extend from the earliest stages of research, including as proposal development, research design and scoping, through accessible delivery of research findings, data, and recommendations.

6. **Continue to advance and develop a common research platform to support climate change planning, policy development, and implementation across all sectors at the state, regional, and community scale**

   A common basis for research includes building from a shared foundation (e.g., emission scenarios and global climate models) to project future climate impacts (e.g., temperature, humidity, precipitation and hydrology, wildfire, etc.) and assumptions on land use and land cover change, carbon dynamics, population, and economic growth.

7. **Leverage and complement existing research funding and policy innovations to accelerate climate change research, innovation, and policy and technology deployment**

   Research projects should demonstrate how they advance research supported by additional funding sources and/or build on recent accomplishments in climate change policy or planning to achieve specific outcomes.

III. SGC RESEARCH PRIORITIES

Through consultation with State agencies and other State climate change research programs, the SGC has identified the following five priority research areas for investment through in its Climate Change Research Program. These areas were identified to complement existing State research investment programs, specifically to focus on crosscutting research needs and to address areas not captured in current research investments.

1. Supporting and Protecting Vulnerable Communities from the Impacts of Climate Change

2. Integrating Land Use, Conservation, and Management into California's Climate Change Programs
3. Increasing Data Accessibility and Planning Support for Local and Regional Climate Change Planning
4. Accelerating and Supporting Transitions to Climate Smart Communities
5. Low-GHG Transformative Technology Development and Deployment

These areas represent a larger body of need than can be supported through a single cycle of funding, but will provide an ongoing foundation for future investment, if available. Applicants will be asked to develop an application that addresses a specific research question (Research Project Grant) or that addresses a priority research area or areas (Research Partnership Grant).

A. RESEARCH PRIORITY 1: SUPPORTING AND PROTECTING VULNERABLE COMMUNITIES FROM THE IMPACTS OF CLIMATE CHANGE

Evidence shows that climate impacts have disproportionate effects in the State's most vulnerable communities and populations.[8] The biophysical impacts of climate change may disproportionately impact vulnerable groups, negatively impacting their health and livelihoods.[9] More holistic adaptation requires adopting policies that allow vulnerable communities to withstand the impacts of climate change while simultaneously addressing existing inequities. Policies intended to adapt and strengthen resilience in the face of climate change also have the potential to exacerbate existing inequities and vulnerabilities if they are not designed from the outset to address, rather than further entrench these patterns. The State has committed to protecting the most vulnerable communities.[10]

Through its Climate Change Investments, the State is committed to delivering major economic, environmental, and public health benefits for Californians, including meaningful benefits to the most disadvantaged communities. In many cases, these are the same communities that are most vulnerable to changing climate conditions. However, research is needed to better understand vulnerability in the context of a changing climate and to further refine how we understand, define, and integrate climate vulnerability in State programs and investments. Research products in this area could include tool development and comparisons across existing tools and multi-attribute analysis of climate risk. Partnership with community groups should be a key component of research to address vulnerable and disadvantaged community needs for climate resilience.

B. RESEARCH PRIORITY 2: ACCELERATING AND SUPPORTING TRANSITIONS TO CLIMATE SMART COMMUNITIES

California's cities, counties, tribes, and regions are critical partners in achieving the State's climate change goals – both to reduce GHG emissions and build resilience. Adoption of clean energy technologies and investments in active transportation, transit, and zero-emission technologies must be supported at all levels of government. Increasing the development and implementation of climate-informed planning and policies at the local and regional level will be critical to the State's climate success.

[8] Shonkoff, S.B., Morello-Frosch, R., Pastor, M., and Sadd, J. 2011, The Climate Gap: environmental health and equity implications of climate change and mitigation politics in California- A Review of the Literature. *Climatic Change*, DOI 10.1007/s10584-011-0310-7, 19p.
[9] CDPH, Climate Change and Health Equity Program. https://www.cdph.ca.gov/Programs/OHE/Pages/CCHEP.aspx
[10] Executive Order B-30-15

Additional research is needed to understand the barriers and challenges to community transformation and its just and equitable distribution. This can include work to understand implementation of low-carbon technologies, but also uptake of alternative modes of transportation or clean energy. Furthermore, research is needed to better understand and quantify the effectiveness of some local-scale climate interventions.

C. RESEARCH PRIORITY 3: INTEGRATING LAND USE, CONSERVATION, AND MANAGEMENT INTO CALIFORNIA CLIMATE CHANGE PROGRAMS

Conservation, management, and development of California's land base have important implications for the State's climate change policy. Conversion of land can lead to the loss of stored carbon, agricultural food production, and diminish ecosystem services. Resulting development can also result in an increase in emissions through driving and energy consumption. Changes on the landscape also have important implications for the ability of natural systems, infrastructure, and communities to prepare for, respond to, and recover from climate-induced changes and extreme events.

Additional research is needed to understand the relationships between natural and social systems, and to develop mechanisms that integrate and account for ecosystem services (including those from freshwater and coastal environments) in conservation, management, and development decisions and in the State's climate change programs. Research results can include tools and methodologies to assess and advance State and local planning decisions. Addressing these issues will require expertise spanning multiple disciplines, including planning, public policy, economics, ecology, agriculture, and others.

D. RESEARCH PRIORITY 4: INCREASING DATA ACCESSIBILITY AND PLANNING SUPPORT FOR STATE, LOCAL, AND REGIONAL CLIMATE CHANGE PLANNING

Cal-Adapt, the state's interactive website for exploring climate change at a local level, was developed with energy-related funds to support adaptation and planning in the electricity and natural gas sectors. However, as a publicly available, free tool, Cal-Adapt has been adopted to support resilience initiatives beyond the energy sector. For example, the 2017 update of California's General Planning Guidelines points local governments to Cal-Adapt to support a statutorily required adaptation element of general planning. Similarly, the adaptation guidance from the Governor's Office of Planning and Research directs state agencies to Cal-Adapt as a supporting resource.

Additional research is needed to broaden the scope and data available in Cal-Adapt so that it can effectively support resilience initiatives beyond the energy sector. Research products in this area will likely include tool development, including integration of community adaptive capacity with climate hazards, as well as assessments of user needs and identification of approaches for the long-term sustainability of planning support tools like Cal-Adapt or other resources for planning.

E. RESEARCH PRIORITY 5: LOW-GHG TRANSFORMATIVE TECHNOLOGY DEVELOPMENT AND DEPLOYMENT

California needs to advance the rapid deployment of low-GHG technologies to rapidly reduce GHG emissions. Research in this area will include State agencies and private sector partners to identify promising technologies or tools that would achieve significant GHG emission reductions through widespread deployment over the next two decades. The emphasis would be on transformative technologies that are envisioned as needed to achieve the 2030 and 2050 GHG reduction targets but require significant technological breakthroughs to achieve

significant market penetration. Research investment will focus on technological, policy, and financial tools needed to advance technology deployment.

IV. PROGRAM STRUCTURE

To achieve the goals outlined above, the Strategic Growth Council will distribute research funding through various research funding mechanisms, including but not limited to:

A. RESEARCH PROJECT GRANTS

Research project grants will be awarded to individual researchers or research groups to examine a specific research topic. Results are expected at the completion of the grant. SGC staff will administer and manage grant implementation and progress, with assistance from relevant state agencies, boards, or departments.

B. RESEARCH PARTNERSHIP GRANTS

Research Partnership Grants will be awarded to research consortia, collaboratives, centers, or institutes with a focus on a broader research priority area. The grant recipient will work in collaboration with SGC to administer and allocate funds to specific research initiatives. Research Partnership Grants provide an opportunity to develop and model collaborative research partnerships to achieve SGC's goals. The proposal should include a model for State - Academic collaboration and engagement with community-based organizations or other stakeholders in the research process.

2) INNOVATION CENTER RESEARCH GRANTS

Innovation Center Research Grants will be awarded to established R&D divisions within a Research Institution to develop transformative, scalable clean technologies specified in a program solicitation that are widely seen as necessary to achieve the State's 2030 and 2050 greenhouse gas reduction targets but require significant breakthroughs to achieve market penetration. following a Legislative funding appropriation to the Climate Change Research Program as part of its annual allocation of Greenhouse Gases Reduction Fund revenues Funded activities cannot duplicate any of the State's other R&D initiatives. It will serve as a bridge between ideas developed in research settings like academia and technology commercialized in funding settings like the venture capitalism industry.

3) INCORPORATING PARTNERS INTO RESEARCH PROPOSALS

Developing partnerships is essential to performing research that addresses concrete needs and delivers direct benefits. There are multiple advantages to building connections between researchers and non-traditional research partners, such as expanding collective capacity communities and creating collaborative sharing of knowledge between partners – all while meeting time, inquiry and funding commitments. Strong local engagement and cross-sector partnerships are critical to reducing greenhouse gas emissions, and can serve as a model for catalyzing local and multi-sector research questions while being responsive to the anticipated needs of the partnership.

SGC will prioritize funding research proposals that demonstrate robust, diverse, or unique multi-stakeholder partnerships featuring key stakeholders that can transform research findings into action, Applicants should propose how they intend to structure and coordinate partnerships to advise and support the research from the proposal process through grant closeout. Discussion should include the roles and responsibilities of partners, a process for decision-making, meeting facilitation, and any pertinent legal or financial considerations. Research proposals can include Partners as sub-applicants that can be funded in the proposed research project budget.

Examples of possible non-traditional research partners include, but are not limited to:

- Community-based organizations – including civic, community, and advocacy groups
- Federal research agencies and departments – such as NOAA, USGS, etc.
- Local land use agencies, departments, and organizations
- Local health agencies, departments, and organizations
- Non-profit organizations – including conservation, environmental justice and natural resources
- Open space landowners and recreation providers
- Private sector businesses
- Regional agencies – focused on transportation, resources, and infrastructure
- Regional climate collaboratives
- Tribes

V. PROGRAM ADMINISTRATION AND APPLICATION INSTRUCTIONS

A grant solicitation for the Climate Change Research Program will be released following a funding appropriation by the Legislature based on priorities of the Council. SGC staff will also schedule technical workshops in support of each program solicitation to provide direction and assistance to potential applicants. Below is a summary describing eligibility, requirements and the process for submitting research proposals. Additional details will be included in the applicable grant solicitation document.

A. THRESHOLD REQUIREMENTS

1) Demonstrate how the proposed research will facilitate the reduction of greenhouse gas emissions in California.

2) Discuss how the research will benefit low-income or disadvantaged communities.

3) Describe how the research aligns with the goals of the Climate Change Research Program (Section II)

4) Align the research with one or more of the program's Research Priority Areas funded in the applicable program solicitation document (Section III)

B. ELIGIBLE APPLICANTS

The lead applicant on each proposal must be affiliated with one of the following institutions:

- University of California,
- California State University,
- Federally-funded national laboratories, and
- Private, non-profit colleges and universities or research institutions located in California.

C. INDIRECT COST RATE

In order to balance the need to ensure that all applicants have an opportunity to successfully compete for an award, while complying with the Cap-and-Trade Auction Proceeds Funding Guidelines[11] the SGC has established a maximum indirect cost rate. Specifically, SGC is responsible for developing a rate that is reasonable and directly tied to the implementation of the research project. As part of program reporting, SGC must specify overhead costs

[11] https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/2017_draft_funding_guidelines.pdf

for funding recipients. These costs must be reported as part of the California Climate Investments expenditure record. Please note that cost effectiveness is a policy consideration in the programmatic review process.

- The Strategic Growth Council establishes a maximum indirect cost rate of 25% for the Climate Research Program, unless otherwise identified in the applicable program solicitation document.

D. PROGRAM TIMELINE

All funds administered through this program must be encumbered and closed out by dates that are described in the funding appropriation legislation and included in the applicable program solicitation document.

E. APPLICATION INSTRUCTIONS

As part of the program's applicable program solicitation document, the SGC will provide instructions regarding the review and selection criteria for awarding program grants.

F. PUBLIC ACCESS TO SGC FUNDED RESEARCH

SGC requires all Climate Change Research Program funded research to provide free and open access to final manuscripts of scholarly articles, reports, and other products produced entirely or primarily with program funding. These and additional published materials are required to be submitted to Integrated Climate Adaptation and Resiliency Program's Adaptation Clearinghouse after acceptance, and no later than upon publication. Such manuscripts shall be made publicly available through the Clearinghouse by the Governor's Office of Planning and Research one year after publication by the journal.

Additionally, proposed research budgets are encouraged to include funding for disseminating research results and findings through an open access publishing platform.

G. ADMINISTRATIVE AND GRANT AGREEMENT REQUIREMENTS

Grant Agreements will be executed between the State of California (State) and the Lead Applicant only. The Lead Applicant is the "Grantee" and Co-applicants will be referred to as "Partners. The Grantee will be responsible for compiling and submitting all invoices and reporting documents for themselves and all Partners. Upon receipt of appropriate documentation, Research funds will be paid to the Grantee, which will be responsible for dispersing payment to Partners, as approved by the State. Grantees are responsible for complying with SGC progress reports and ARB requirements for reporting on the California Climate Investment initiatives' projects.

VI. PROPOSAL REVIEW AND SELECTION PROCESS

Proposals will be reviewed by an Advisory Committee consisting of external panelists selected for disciplinary expertise, and a State Interagency Committee consisting of representatives from state agencies and departments. Specific research and meaningful engagement criteria, as well as the process used to review and select grant awards will be described in the applicable program solicitation document. Each proposal will be considered on its own merits. In order to be considered for an award, proposals must comply with all of elements described in Section IV, Program Structure, of this Plan. Submissions that do not comply will not advance to a merit review.

VII. RESEARCH PROJECT RECOMMENDATIONS AND AWARDS

Following the review and selection processes in the program's grant cycle, a suite of recommended Climate Change Research proposals will go before the Council (ten days after posting the list of recommendations). Please note that a recommendation to the Council to fund a research proposal does not constitute approval or obligation of funds.